MicroDIN Quick Start Guide

Communicating Subpanel Temperature Controller

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0600-0011-0002 Rev B

February 2003 **$5.00**

Introduction to the MicroDIN Controller

The Watlow MicroDIN controller is a DIN rail-mounted, temperature controller. It uses one input and two outputs, network connections and dozens of parameters to satisfy a broad variety of control needs.

The single input can use either a thermocouple or RTD sensor. The single control output provides an open collector or switched dc output signal for a power switching device with a DC input. The single alarm output is an electromechanical relay. The network connections allow as many as 32 controllers to be configured and monitored from a single personal computer.

You can configure, operate and monitor the MicroDIN almost entirely from a PLC or personal computer via a serial connection using RJ-11 jacks. Indicator lights on the face of the controller monitor error states, power, communications activity and output activity.

Communications Input and Output to and from Personal Computer

1-32 devices/ EIA-485 Network

Per Unit:

- **Sensor Input from the process**
- **Control Output to the process**
- **Alarm Output about the process**

Figure 2 - MicroDIN inputs and outputs in a thermal system

Note: An electronic copy of this MicroDIN Quick Start Guide and the full version MicroDIN User's Manual is available at www.watlow.com/prodtechinfo. Search on keyword MicroDIN.

3 Watlow MicroDIN Quick Start Guide

Setup Steps

1. Set up communications.
2. Set the controller's address and baud speed with the DIP switches on the top panel (see page 6). The controller uses eight data bits with no parity.
3. Mount the controller (see pages 9 and 10).
4. Wire the controller (see pages 12-14).
5. Communicate with MicroDIN via an EIA-485 network with Modbus™ RTU protocol.

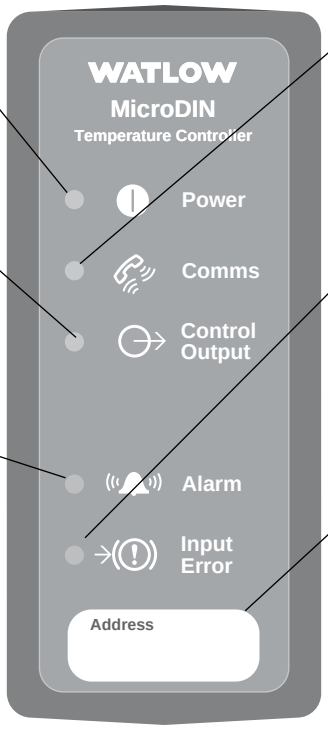
Indicator Lights

Figure 3 - MicroDIN indicator lights

Power
Green light stays lit when the power is on and the controller is ok.
• If it isn't on or pulsates, check your power source.

Control Output
Green light is lit or flashes when the control output is energized.
• If it does not light up, the output is not turning on.

Alarm
Red Light is lit during an input alarm condition.
If it is lit:
• Correct alarm condition or change alarm configuration.
• Reset the alarm if it is latched.



Communications
Green Light pulsates when the controller sends or receives valid data over its network port.
• If it does not light up, check the controller address and the communications setup.

Input Error
Red Light is lit if there is a sensor problem. If it is lit:
• Verify the sensor wiring, polarity and function.
• Rewire or replace as necessary.

Address Field
Record the unit's address in erasable marker here.

Communications Overview

EIA-485 Network

The MicroDIN uses the EIA-485 (formerly, “RS-485”) hardware interface to communicate with three wires in a half-duplex configuration, up to 32 remote devices with a master unit on a network up to 4,000 feet long using 14-26 gauge wire.

Modbus™ Protocol

The MicroDIN uses Modbus™ RTU protocol to read and write to registers that can be viewed or changed from a personal computer. Each MicroDIN ‘parameter’ has a corresponding Modbus™ register and access privileges. The MicroDIN parameter register numbers and the order of priority appear later in this chapter. Chapter 5 details all the MicroDIN parameters, and the Appendix provides information on how to write custom Modbus™ applications

Set Address/Baud Rate

You must configure the communications speed and network address of the MicroDIN controller with the eight-bit DIP switch on the top of the unit. Set the controller address with the first six switches and the network speed (9,600 or 19,200 baud) with the eighth switch. Turn to the DIP switch page 6.

Serial Data Format

The MicroDIN uses the an 8-N-1 data format; 8 data bits, no parity, 1 stop bit, and 1 start bit. See the data format table later in this chapter.

Wiring Tasks

In addition to wiring the controller's input, outputs and power connections, you must also wire the EIA-232-to-EIA-485 converter; connect your computer to the MicroDIN, and connect the MicroDIN communications daisy chain. See “Communications Wiring” on pages 14 and 15.

Communications Software

Watlow offers a Windows application for MicroDIN, called, WATVIEW™ which will both set up and run multiple MicroDINs over an EIA-485 network using the Modbus™ protocol. For more information on WATVIEW™, go to www.watlow.com/products/software.

You may also write your own application (see Appendix for more detail), or purchase any of several available Modbus-capable control software packages.

Modbus™ Register Numbers

Address

Absolute	Relative	Parameters
40001	0	Model Number (Diagnostics)
40002	1	Serial Number (Characteristics)
40003	2	Serial Number 2 (Characteristics)
40004	3	Software ID number (Characteristics)
40005	4	Software Revision (Characteristics)
40006	5	Date of Manufacture (Characteristics)
40007	6	Ship Date (Characteristics)
40017	16	Control Output Hardware (Control Output)
40018	17	Alarm Output Hardware (Alarm)
40025	24	Disable Non-volatile Memory (System)
40101	100	Input Actual (Input)
40102	101	Input Error (Input)
40104	103	Output Power (Control Output)
40107	106	Alarm Condition (Alarm Output)
40201	200	Operation Mode (Operation)
40205	204	PID Output Power (PID)
40206	205	Proportional Term (PID)
40207	206	Integral Term (PID)
40208	207	Derivative Term (PID)
40210	209	System Error (Error)
40211	210	Open Loop Error (Error)
40301	300	Set Point (Operation)
40302	301	User Operation Mode (Operation)
40305	304	Auto-tune Set Point (PID)
40306	305	Initiate Auto-tune (PID)
40311	310	Manual Output Power (Operation)
40312	311	Clear Error (Error)
40322	321	Alarm Low (Alarm Output)
40323	322	Alarm High (Alarm Output)
40332	331	Clear Alarm (Alarm Output)
40333	332	Silence Alarm (Alarm Output)
40501	500	Proportional Band (PID)
40502	501	Integral (PID)
40503	502	Reset (PID)
40504	503	Derivative (PID)
40505	504	Rate (PID)
40507	506	Cycle Time (PID)
40508	507	Control Output Hysteresis (PID)

Address

Absolute	Relative	Parameters
40601	600	Sensor Type (Input)
40602	601	Input Type (Input)
40603	602	Range Low (Input)
40604	603	Range High (Input)
40605	604	Filter Time Constant (Input)
40606	605	Calibration Offset (Input)
40607	606	Decimal Point (System)
40608	607	Error Clearing Mode (Error)
40701	700	Control Output Function (Control Output)
40714	713	Power Limit Set Point (Control Output)
40715	714	High Side Power (Control Output)
40716	715	Low Side Power (Control Output)
40718	717	Alarm Output Function (Alarm Output)
40720	719	Alarm Type (Alarm Output)
40721	720	Alarm Hysteresis (Alarm Output)
40722	721	Alarm Latching Mode (Alarm Output)
40723	722	Alarm Silencing Mode (Alarm Output)
40724	723	Alarm Active Sides (Alarm Output)
40725	724	Alarm Logic (Alarm Output)
40901	900	Units Type (System)
40902	901	C or F (System)
40903	902	Input Error Action (Input)
40904	903	Fixed Manual Output (Control Output)
40905	904	Activate Open Loop Detect (Error)
41501	1500	Ambient (CJC) Temperature (System)
41502	1501	Ambient (CJC) A-to-D Counts (Diagnostics)
41503	1502	RTD Lead Compens. A-to-D Counts (Diag)
41504	1503	RTD Lead Resistance (Diagnostics)
41505	1504	Input A-to-D Counts (Diagnostics)
41513	1512	Enter Diagnostics Mode (Diagnostics)
41514	1513	Test Displays (Diagnostics)
41515	1514	Test Outputs (Diagnostics)
41601	1600	Enter Calibration Mode (Calibration)
41602	1601	Restore to Factory Calibration (Calibration)
41603	1602	Reset Factory Defaults (Calibration)
41604	1603	Calibration Commands (Calibration)

MicroDIN DIP Switches Set Address/Baud Rate

Configure the communications speed and network address of the MicroDIN controller with the eight-bit DIP switch on the top panel. Set the controller address with the first six switches. Set an address between 1 and 63. The network will not work correctly if any two controllers have the same address. DIP switch 1 sets the left-most binary digit. Switch 6 sets the right-most digit.

Record the MicroDIN's address in erasable marker on the white space on the front of the unit.

The seventh switch has no effect.

Set the network speed (9,600 or 19,200 baud) with the eighth switch.

Figure 6 - MicroDIN top view with DIP switches and baud settings

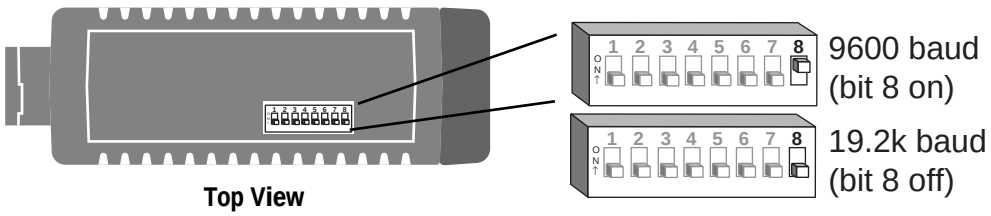


Table 6 - Decimal-to-binary conversion

Dec.	Binary	Dec.	Binary	Dec.	Binary	Dec.	Binary
1	000001	16	010000	32	100000	48	110000
2	000010	17	010001	33	100001	49	110001
3	000011	18	010010	34	100010	50	110010
4	000100	19	010011	35	100011	51	110011
5	000101	20	010100	36	100100	52	110100
6	000110	21	010101	37	100101	53	110101
7	000111	22	010110	38	100110	54	110110
8	001000	23	010111	39	100111	55	110111
9	001001	24	011000	40	101000	56	111000
10	001010	25	011001	41	101001	57	111001
11	001011	26	011010	42	101010	58	111010
12	001100	27	011011	43	101011	59	111011
13	001101	28	011100	44	101100	60	111100
14	001110	29	011101	45	101101	61	111101
15	001111	30	011110	46	101110	62	111110
		31	011111	47	101111	63	111111

Required Parameters Setup Order

This table provides 1) the correct order of entry, 2) the effect of a parameter change, and 3) a place to document settings.

Changing this →

Affects this ↓

⚠ CAUTION: Parameters should be set up in this order. ↓

Affects this	Units Type	C or F	Control Output Function	Sensor Type	Input Type	Range Low	Range High	High Side Power	Low Side Power	Alarm Type	Operation Mode	Decimal	Document your settings below
Units Type													
C or F													
Input Error Action													
Control Output Function													
Set Fixed Manual Output			O										
Open Loop Detect													
Sensor Type													
Input Type				O									
Range Low		C		D	D							C	
Range High		C		D	D							C	
Decimal Point				D	D								
Calibration Offset		C		D	D							C	
Filter Time Constant				D	D								
Error Clearing Mode													
Power Limit Set Point		C		D	D							C	
High Side Power			O										
Low Side Power			O										
Alarm Output Function													
Alarm Type				D	D								
Alarm Hysteresis		C		D	D							C	
Alarm Latching Mode													
Alarm Silencing Mode													
Alarm Active Sides													
Alarm Logic													
Alarm High		C		D	D					O		C	
Alarm Low		C		D	D					O		C	
Propband		C		D	D							C	
Integral	O												
Reset	O												
Derivative													
Rate													
Cycle Time													
Output Hysteresis		C		D	D							C	
Operation Mode													
Set Point													
Manual Output Power			O					O	O		O		
Set Point		C		D	D	O	O					C	

Key:

D = Changing will change the default

C = Changing will convert the temperature scale

O = Other effect (see Ch. 5)

Table 7 - Parameters Setup order

Serial Data Format

Configure your computer's COM1 or COM2 (communications) port data format to match the MicroDIN's settings in the table below.

Table 8a - Serial Data Format

Data Bits	Parity	Stop Bit	Start Bit
8	None	1	1

MicroDIN Installation Wiring Tasks

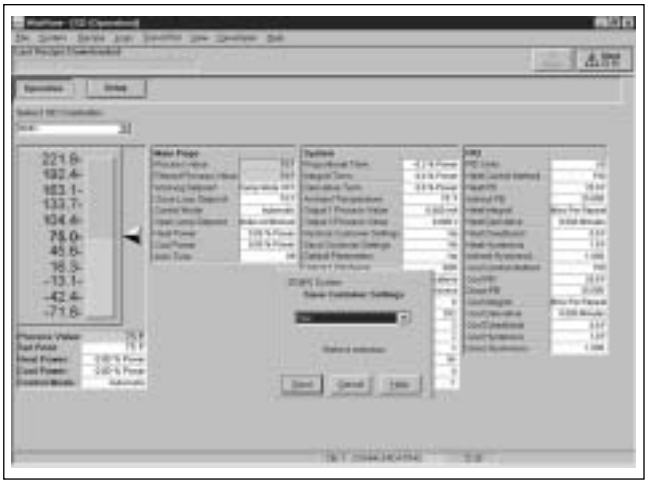
MicroDIN requires these wiring tasks for a successful installation

1. Wire MicroDIN sensor input.
2. Wire MicroDIN Output 1, the control output.
3. Wire MicroDIN Output 2, the alarm output.
4. Wire MicroDIN power.
5. Connect the MicroDIN communications daisy chain.
6. Wire the 232-to-485 converter; connect to the computer.
7. If necessary, wire the termination and pull-up/pull-down resistors.

Communications Software

WATVIEW™

Figure 8b - WATVIEW™ sample software screen



Watlow offers a Modbus™ package in WATVIEW™, software that will set up and run multiple MicroDINs over an EIA-485 network. WATVIEW™ is available from any Watlow sales representative or authorized distributor. For more information, go to www.watlow.com /products/software. WATVIEW™ can handle up to 32 MicroDIN units.

Other Software

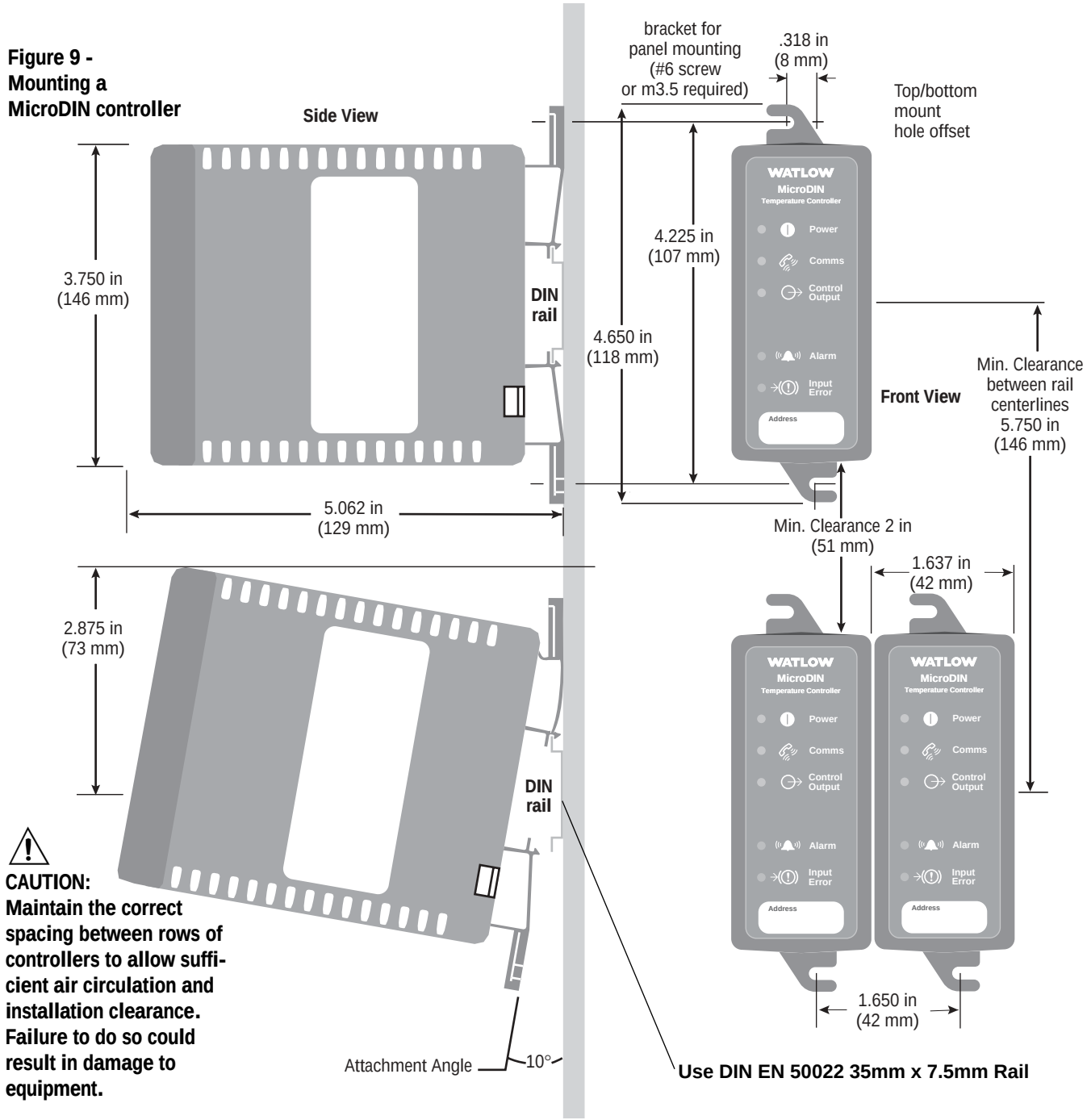
To communicate with MicroDIN, you must use a Modbus™ RTU (remote terminal unit) compatible software package. Sending ASCII commands via a standard serial communication application will not work. Refer to the Appendix in the User's Manual if you're writing your own Modbus™ RTU application.

Mounting the MicroDIN

To mount a MicroDIN on a DIN rail, hook the upper lip of the rail mounting bracket onto the rail and press the controller down until the bottom lip of the mount snaps onto the rail. To remove, as you push the back of the controller down lift the front up until the bottom lip unsnaps from the rail.

To mount a MicroDIN on a panel, use the dimensions below to drill screw holes for the mounting bracket.

Figure 9 - Mounting a MicroDIN controller



CAUTION:
Maintain the correct spacing between rows of controllers to allow sufficient air circulation and installation clearance. Failure to do so could result in damage to equipment.

Mounting the MicroDIN on a DIN rail

To Mount MicroDIN

1. Push unit in and down to catch rail hook on top of rail.
2. Rotate bottom of unit in toward rail.
3. Rail clasp will audibly “snap” into place. If the MicroDIN does not snap into place, check to see if the rail is bent.

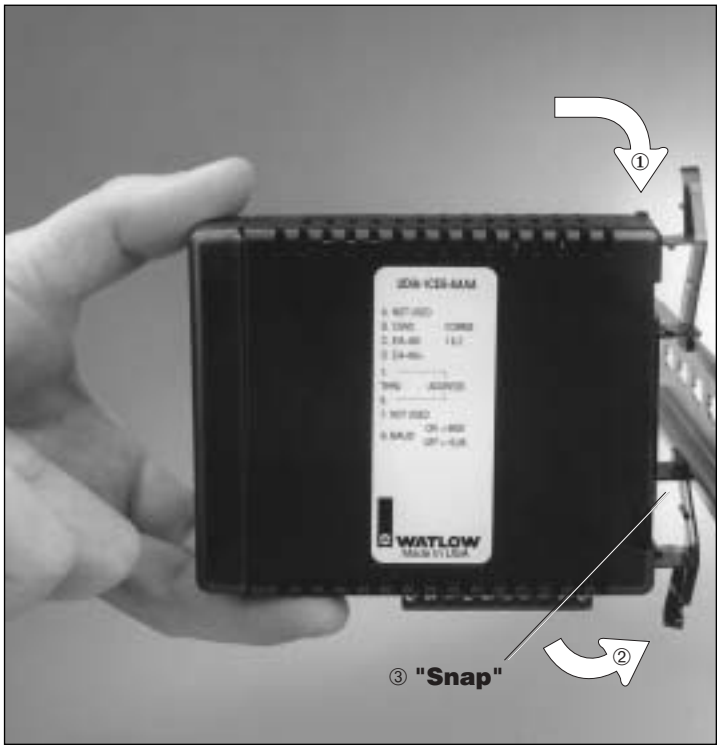


Figure 10a - Mounting a MicroDIN controller on a DIN rail

To Dismount MicroDIN

1. Press down on back of controller until the bottom hook clears the rail.
2. Then rotate bottom up and away from rail.

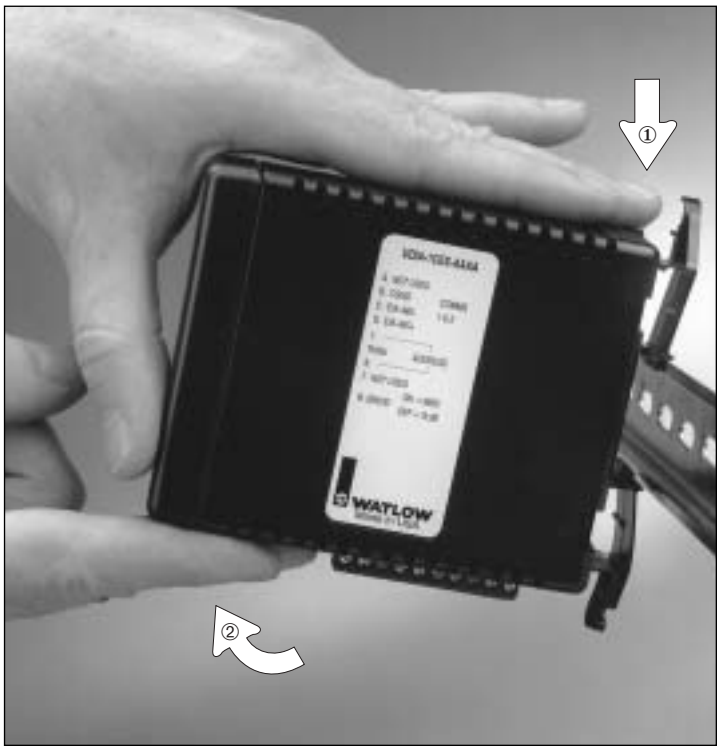


Figure 10b- Dismounting a MicroDIN controller from a DIN rail

MicroDIN RJ-11 and 10-pin Connectors

The MicroDIN 10-pin screw terminal connector, on the bottom of the case, links it to its power supply, control input, control output and alarm output. Use 26- to 14-gauge wire to connect to the plug terminals.

The alarm output is an electromechanical relay.

See the Appendix for information on sensor ranges and specifications. See Chapter 5: Parameters for information about software configuration.

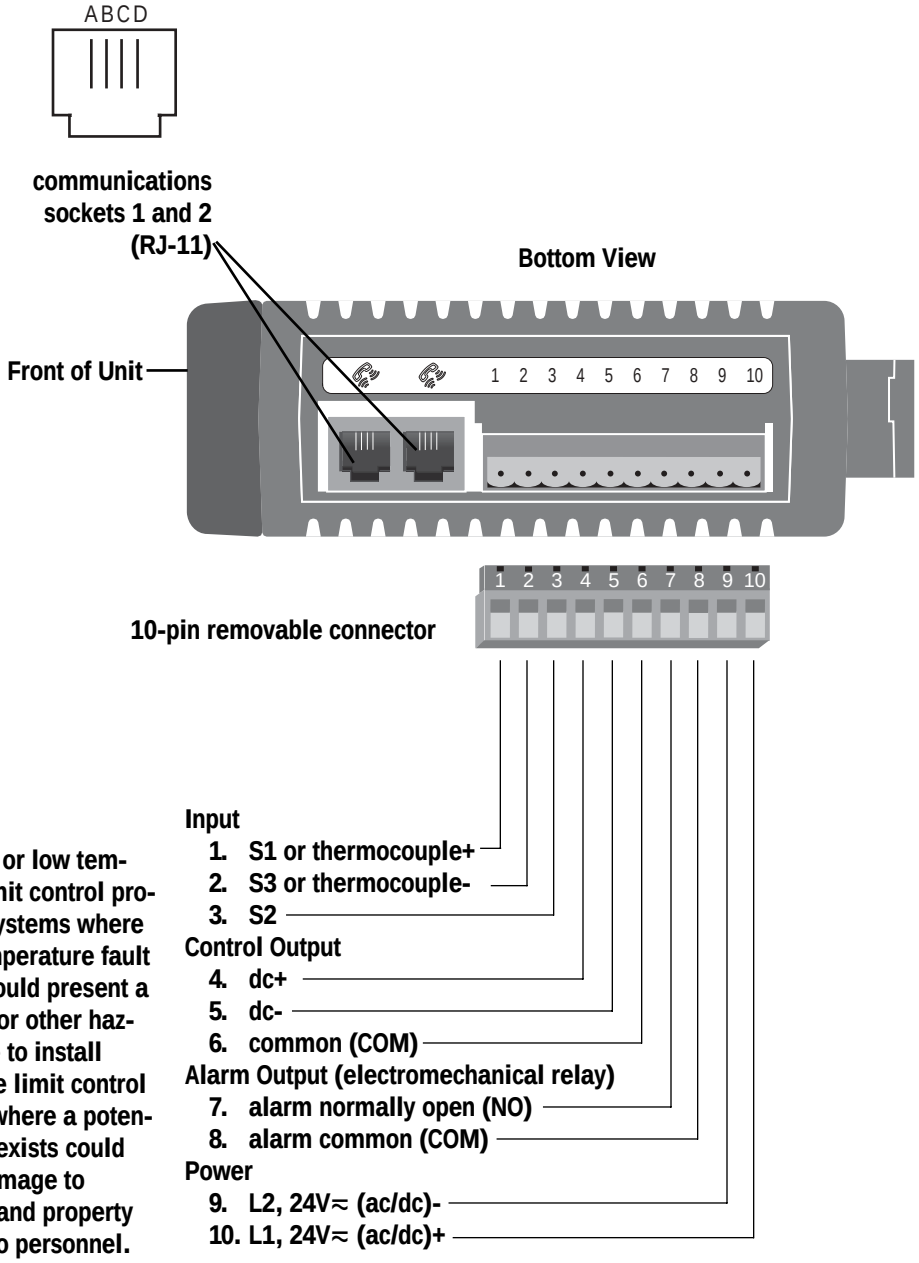


Figure 11 - Bottom view of MicroDIN case with connector assignments

WARNING:
To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury or death.

WARNING:
Install high or low temperature limit control protection in systems where an over temperature fault condition could present a fire hazard or other hazard. Failure to install temperature limit control protection where a potential hazard exists could result in damage to equipment and property and injury to personnel.

Input Wiring

Figure 12a — MicroDIN Isolation Diagram

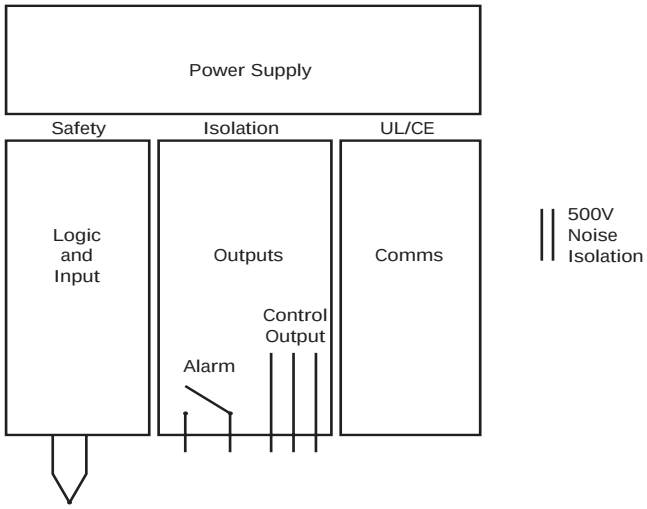


Figure 12b — Control Input, Thermocouple

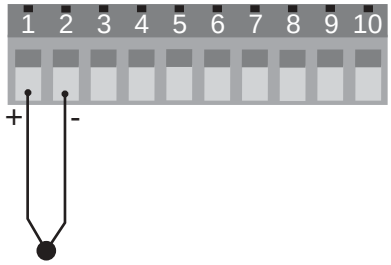


Figure 12c — Control Input, 2-wire RTD

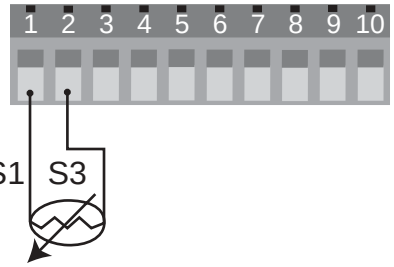
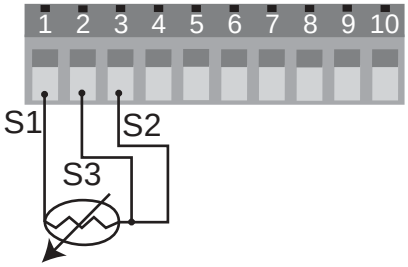


Figure 12d — Control Input, 3-wire RTD



Output and Power Wiring

Figure 13a — Control Output, Switched DC with Internal Power Supply

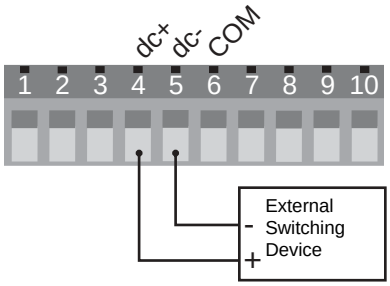


Figure 13b — Control Output, Open Collector with External Power Supply

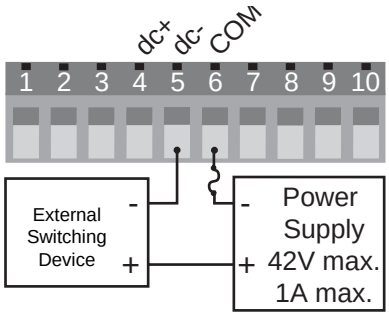
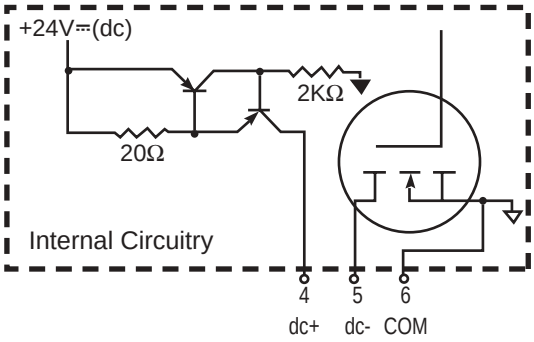
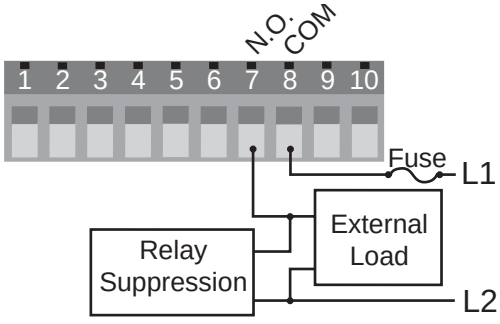


Figure 13c — Internal Output Circuitry



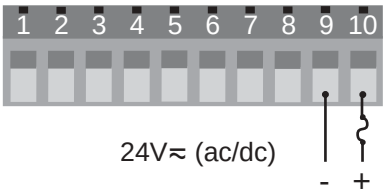
WARNING:
To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury or death.

Figure 13d — Alarm Output



NOTE:
Relay suppression required only for inductive loads.

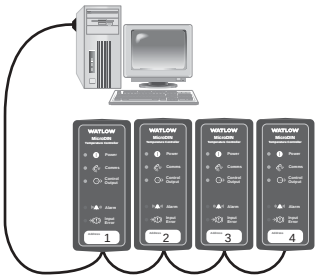
Figure 3.4e — Power Wiring



WARNING:
If high voltage is applied to a this 24V controller, irreversible damage will occur.

Communications Wiring

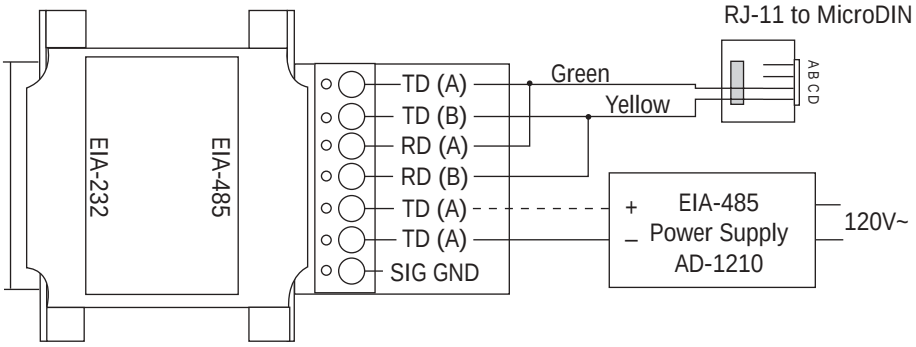
Figure 14a- MicroDIN communications daisy chain via RJ-11 connectors



Note: If your network doesn't function, see Special 485 Network Considerations section.

Converter-To-MicroDIN Wiring Example

Figure 14b- B&B Converter to MicroDIN Wiring (B&B Electronics Manufacturing Company, Ph. 815-433-5100) www.bb-elec.com



WARNING:
To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury or death.

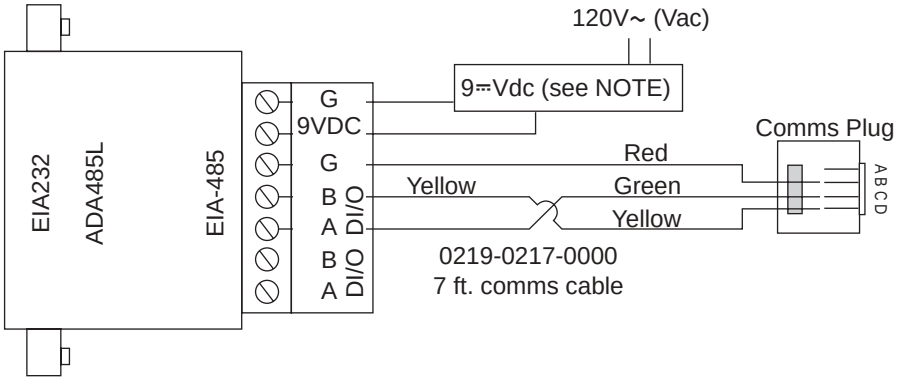


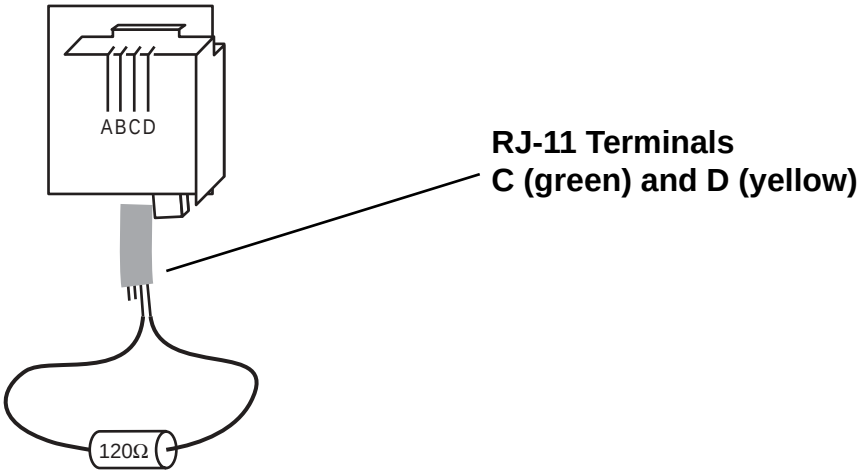
Figure 14c - CMC Converter to MicroDIN Wiring (CMC Connecticut Micro-Computer, Inc. Ph. 800-426-2872) www.2cmc.com

Note: The CMC converter requires an external power supply when used with a laptop.

Special EIA-485 Network Considerations

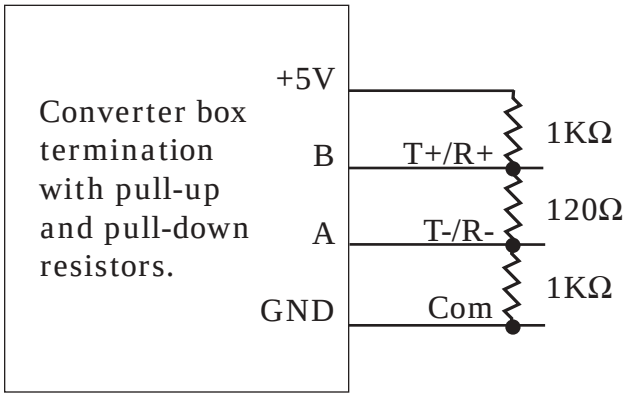
If your MicroDIN network doesn't work, it may need termination and pull-up and pull-down resistors; wire them per the diagrams below.

Figure 15 a- Termination for MicroDIN; RJ-11 phone plug with 120Ω resistor across C and D



Plug terminator into open socket in MicroDIN controller furthest from computer, the last unit on the network.

Figure 15b - Termination for EIA-232/EIA-485 Converter with pull-up and pull-down resistors



WARNING:
To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury or death.

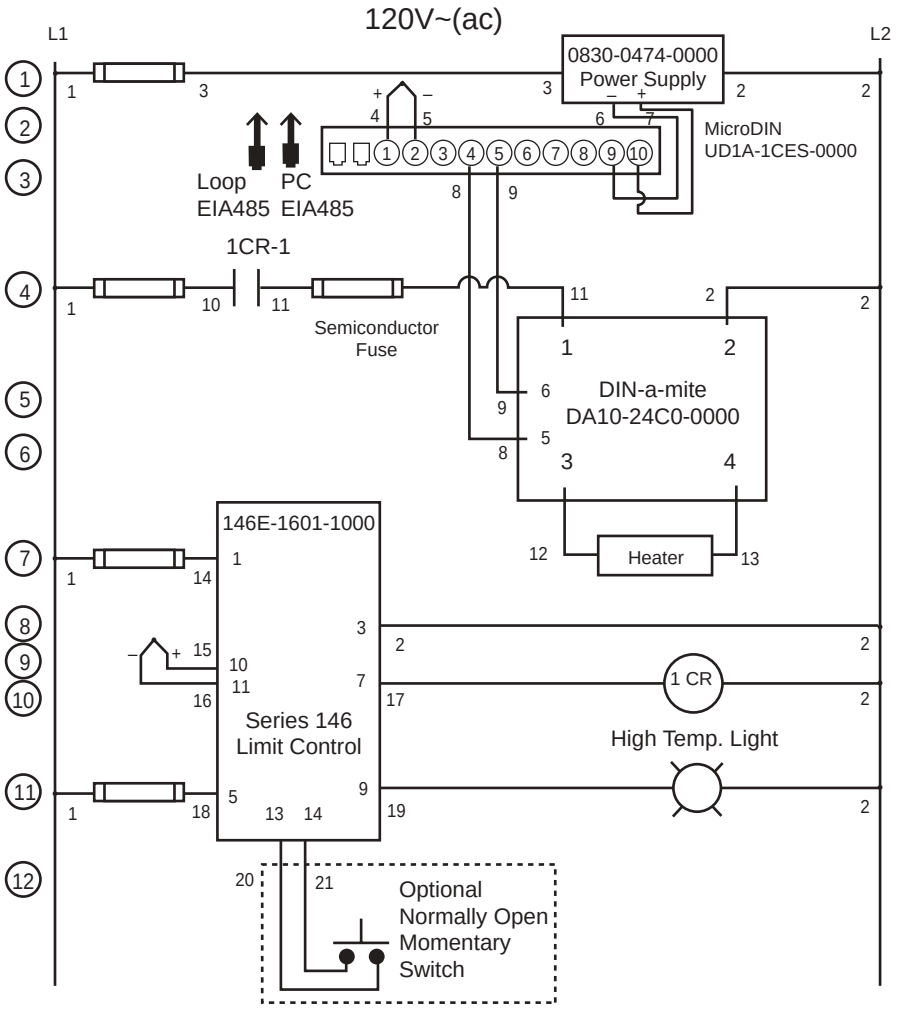
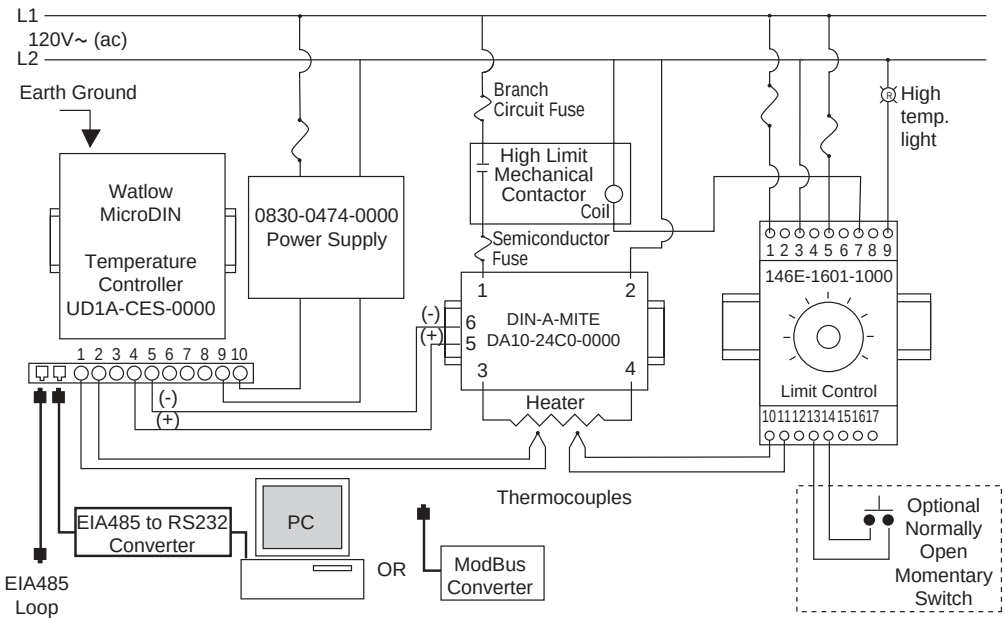


Figure 16 -
System wiring example, ladder diagram

WARNING:
Install high or low temperature limit control protection in systems where an over temperature fault condition could present a fire hazard or other hazard. Failure to install temperature limit control protection where a potential hazard exists could result in damage to equipment and property and injury to personnel.

Wiring Examples

Figure 17 -
System wiring example, schematic



WARNING:
To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury or death.

WARNING:
Install high or low temperature limit control protection in systems where an over temperature fault condition could present a fire hazard or other hazard. Failure to install temperature limit control protection where a potential hazard exists could result in damage to equipment and property and injury to personnel.

Declaration of Conformity

MicroDIN

Watlow Winona, Inc.
1241 Bundy Blvd.
Winona, MN 55987 USA

Declares that the following product:

Designation:	**MicroDIN**
Model Numbers:	UD1A – 1CES – (Any four letters or numbers)
Classification:	Temperature control, Installation Category II, Pollution degree 2
Rated Voltage:	24V≂ to 24V≂ (ac or dc)
Rated Frequency:	50 or 60 Hz
Rated Power Consumption:	5VA maximum

Meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

89/336/EEC Electromagnetic Compatibility Directive

EN 61326:1997 A1:1998			**Electrical equipment for measurement, control and laboratory use – EMC requirements (Industrial Immunity, Class A Emissions).**
EN 61000-4-2:	1996	With A1, 1998:	Electrostatic Discharge Immunity
EN 61000-4-3:	1997:		Radiated Field Immunity
EN 61000-4-4:	1995:		Electrical Fast-Transient / Burst Immunity
EN 61000-4-5:	1995	With A1, 1996:	Surge Immunity
EN 61000-4-6:	1996:		Conducted Immunity
EN 61000-4-11:	1994:		Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2:	1995	With A1-3:1999:	Harmonic Current Emissions
EN 61000-3-3:	1995	With A1:1998:	Voltage Fluctuations and Flicker

73/23/EEC Low-Voltage Directive

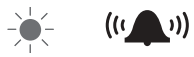
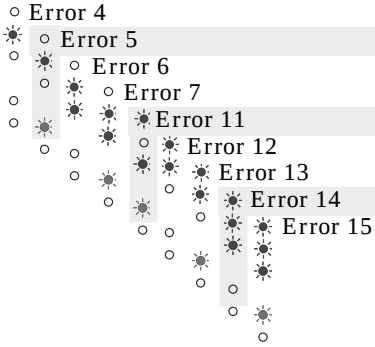
EN 61010-1:	**1993**	**With A1:1995:**	**Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements**

Raymond D. Feller III	Winona, Minnesota, USA
Name of Authorized Representative	Place of Issue
General Manager	January 2003
Title of Authorized Representative	Date of Issue

Signature of Authorized Representative

(2348)

Troubleshooting Alarms and Errors *most likely problems are listed first*

Indication	Symptoms	Probable Cause(s)
Error = off (Normal = steady green)		**Power**
	• No power.	• Power supply switch off • Fuse blown • Breaker tripped • Safety interlock door switch, etc. • Separate system limit control may be latched • Open wiring • Power ≤ 20V≂ (ac/dc)
Error = off (Normal = pulsing green)		**Communications**
	• Unit will not communicate.	• MicroDIN address DIP switch incorrectly set • MicroDIN baud rate DIP switch incorrectly set • MicroDIN unit-to-unit daisy chain disconnected • Reversed, short or open EIA-485 communications wiring • EIA-485 converter box incorrectly wired • Computer COM port incorrectly set up • Communications software setup or address incorrect • Protocol or parity wrong, not 8, n, 1 • Needs termination and pull-up and pull-down resistors
Error = steady red (Normal = off)		**Input Error**
	• Input is in error condition.	• The sensor is improperly wired • Sensor wiring reversed, shorted or open • MicroDIN firmware setting does not = actual sensor • Power ≤ 20V≂ (ac/dc) • Ambient environmental temperature out of spec for MicroDIN • The MicroDIN open loop detect shows a broken sensor • The calibration offset parameter is set much too high or low
 Alarm = steady red (Normal = off)		**Alarms**
	• Alarm won't occur.	• Alarm output off • Alarm set points incorrect • Alarm silenced • Alarm sides incorrect • In diagnostics mode
	• Alarm won't clear.	• Alarm latched • Alarm set points incorrect • Alarm hysteresis incorrect • Input in error condition
Flashing LED Indicator Light Pattern		**Errors** • RAM malfunction • EEPROM data corrupted • PROM malfunction • Logic hardware problem • New firmware installed • Calibration data corrupted • Analog-to-digital hardware failure • EEPROM hardware problem • New unit first power up

Corrective Action

- Check switches, fuses, breakers, interlocks, limits, connectors, etc. for energized condition and proper connection

- Measure power upstream for required level
- Check wire size
- Check for bad connections

- Check and reset unit DIP switches 1-6 to correct address
- Check and reset unit DIP switch 8 to correct baud rate
- Look for a break in the daisy chain
- Verify correct connections and test wiring paths
- Check converter box wiring and its documentation
- Reconfigure computer's COM port setup and verify communications ok
- Check the communication card documentation for setable variables, operational testing
- Restart COMS software, check for settings agreement. Verify COM bus active

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- Check sensor connections
- Check sensor connections and sensor wiring
- Change the Sensor Type parameter (Input Group) to match the sensor hardware
- Measure power upstream for required level
- Verify that the temperature surrounding unit is 32° to 149°F (0° to 65°C)
- Check sensor function. The Open Loop Detect parameter (Error Group) indicates it may be broken
- Check the Calibration Offset parameter (Input Group) value; set it to a lower level

---

- Send the alarming MicroDIN unit a “clear alarm” signal (Modbus™: 331)
  Note: The condition causing the alarm must also be resolved for the alarm to clear
- To clear the alarm, correct the alarm condition; check to see if the alarm is latched
- Check the alarm sides setting
- Check the alarm type setting
- Check the alarm logic for compatibility with system peripherals and annunciators
- Check the power limit setting
- Check the operation mode
- Check the alarm output function
- Check °F/°C setting
- Check the calibration offset value; set it to a lower level

---

- Return unit to factory
- Cycle power to unit
- Return unit to factory
- Return unit to factory
- Cycle power to unit
- Recalibrate unit
- Return unit to factory
- Return unit to factory
- Return unit to factory

Specifications:

(2346)

Control Mode

- Microprocessor-based, user selectable control modes
- Single input, single output
- Heat or cool auto-tuning

Output #1: User selectable

- ON/OFF; P, PI, PD, PID heat or cool action adjustable switching differential: 1 to 9999 or 0.1 to 999.9°F or °C
- Proportional band: 0 to 9999, or 0.0 to 999.9°F or °C
- Integral: 0.00 to 99.99 minutes per repeat
- Reset: 0.00 to 99.99 repeats per minute
- Derivative/Rate: 0.00 to 9.99 minutes
- Cycle Time: 0.1 to 60.0 seconds

Output #2: User selectable

- Process or deviation alarm with flashing alarm status indicator
- Alarm with separate high and low set points
- Hysteresis: 1 to 9999° switching differential

Operator Interface

- EIA-485 serial communications with Modbus™ RTU protocol
- 9600, 19200 user selectable baud rates
- 1 to 63 user selectable address range

Sensor Input

- Sensor input sampling rate: 10 samples/second, 10Hz
- Thermocouple, grounded or ungrounded sensors
- RTD 2 or 3 wire, platinum, 100Ω@ 0°C calibration to JIS curve (0.003916Ω/Ω/°C), or DIN curve (0.00385Ω/Ω/°C)
- Sensor break protection de-energizes control output to protect system or selectable bumpless transfer to manual operation.
- °F or °C, user selectable
- Sensor Ranges:

	Accuracy Ranges:						Operating Ranges					
B t/c	1598	to	3092°F	870	to	1700°C	32	to	3300°F	0	to	1816°C
C (W5) t/c	32	to	4200°F	0	to	2315°C	32	to	4200°F	0	to	2315°C
D (W3) t/c	32	to	4200°F	0	to	2315°C	32	to	4200°F	0	to	2315°C
E t/c	-328	to	1472°F	-200	to	800°C	-328	to	1470°F	-200	to	800°C
J t/c	32	to	1382°F	0	to	750°C	32	to	1500°F	0	to	815°C
K t/c	-328	to	2282°F	-200	to	1250°C	-328°	to	2500°F	-200	to	1370°C
N t/c	32	to	2282°F	0	to	1250°C	32	to	2372°F	0	to	1300°C
PT2 t/c	32	to	2540°F	0	to	1393°C	32	to	2543°F	0	to	1395°C
R t/c	32	to	2642°F	0	to	1450°C	32	to	3200°F	0	to	1760°C
S t/c	32	to	2642°F	0	to	1450°C	32	to	3200°F	0	to	1760°C
T t/c	-328	to	662°F	-200	to	350°C	-328	to	750°F	-200	to	400°C
1.0 RTD (DIN)	-328	to	1202°F	-200	to	650°C	-328	to	1472°F	-200	to	800°C
0.1 RTD (JIS)	-199.9	to	999.9°F	-143	to	636°C	-328	to	1166°F	-200	to	630°C

- Tenth degree resolution selectable over sensor operating range within limits of -199.9 to 999.9, except for thermocouple types B, R, and S

Primary Control Output (heating or cooling)

- Output update rate: 10 per second, 10Hz (maximum)
  Internal Load Switching (nominal):
  Switched dc (isolated) signal, 22 to 28V⎓(Vdc), current limited @ 30mA
  Overload current and short circuit protection
  External Load Switching (maximum):
- Open Collector 42V⎓(Vdc) @ 1A

Alarm Output

- Output update rate 2 per second (2Hz)
- Electromechanical relay, Form A, 2A @ 30V⎓(Vdc) or 240V~(Vac),
- Alarm output can be latching or non-latching, and process or deviation with separate high and low values. Alarm silencing (inhibit) on power-up.

Accuracy

- Calibration accuracy and sensor conformity: ±0.1% of span ±1°C @ 25°C ±3°C (77°F ±5°F) ambient, and rated line voltage ±10% with the following exceptions:
  Type T; 0.12% of span for -200°C to -50°C
  Types R and S; 0.15% of span for 0°C to 100°C
  Type B; 0.24% of span for 870°C to 1700°C
- Accuracy span: Less than or equal to operating ranges, 1000°F/540°C minimum.
- Temperature stability: ±0.2 °C/°C (±0.2 °F/°F) rise in ambient maximum for thermocouples, ±0.05 °C/°C (±0.05 °F/°F) rise in ambient maximum for RTD sensors
- Voltage stability: ±0.01% of span per percent of rated line voltage

Safety Agency Approvals

- UL/C-UL 508, File # E102269
  Industrial Control Equipment
- CE to EN 61010

Electromagnetic Compatibility and Immunity

- Complies with EN 50081, EN 50082

Terminals

- Touch-safe set screw type, accepts 26 to 14 gauge wire

Power

- 24-28V≂(Vac/Vdc), -15%, +10% [20.4 to 30.8V≂(Vac/Vdc)]; 50/60Hz ±5% for V~(Vac)
- 5VA typical power consumption
- Data retention upon power failure via nonvolatile memory
- Sensor input isolation to switched dc output and communication circuitry
  500V~(Vac) dielectric

Operating Environment

- 32 to 149°F (0 to 65°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 158°F (-40 to 70°C)

Dimensions

- Width x Height x Depth
  1.64" x 4.65" x 5.19" DIN rail mount
  (42mm x 118mm x 132mm)
  1.64" x 4.65" x 5.06" Chassis mount
  (42mm x 118mm 129mm)
- Mounts on DIN rail per DIN EN 50022 (35mm x 7.5mm)

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These specifications are subject to change without prior notice.

Ordering Information (2347)

To order, complete the code number to the right with the information below:

U D 1 A - 1 C E S - _ _ 0 0

MicroDIN Controller - DIN Rail Mount Temperature Controller with no operator interface and EIA-485 Modbus™ RTU Serial Communications.

Hardware
1A = Single channel, low voltage

Input
1 = Type B, C, D, E, J, K, N, PT2, R, S, T, 1°RTD, 0, 1°RTD (JIS and DIN)

Control Output
C = Switched (DC), logic signal, isolated.

Alarm Output
E = 1 Electromechanical relay, Form A, 1A, W/O contact suppression

Electromechanical relays are warranted for 100,000 closures only.

Communications
S = EIA/TIA-485 Communications, opto isolated, Modbus™ RTU protocol

Software
00 = Standard
XX = Custom software or setup parameters

WATVIEW™ Configurator Edition Includes only spreadsheet display, setup screens recipe manager without calendar start.	**WATVIEW™-C**
WATVIEW™ Run-Time Edition Includes all the features of the Configurator edition plus alarm management, recipe calendar start, user event log, data logging, trend graphing.	**WATVIEW™-R**
WATVIEW™ Developer Edition Includes all the features of the Run-Time edition plus capability of developing custom screens.	**WATVIEW™-D**

MicroDIN Accessories

6-inch communications cable (RJ-11, 4 conductor, straight through)	**0219-0218-0000**
7-foot communications cable (RJ-11, 4 conductor, straight through)	**0219-0217-0000**
10-pin removable connector with screw terminals	**0836-0445-0000**
Communications converter (EIA-232 to EIA-485)	**0830-0473-0000**
Power Supply 120V~ (Vac) input, 24V⎓ (Vdc) output	**0830-0474-0000**

How to Reach Us

Technical Assistance

If you encounter a problem with your Watlow controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists after checking the configuration of the controller, you can get technical assistance from your local Watlow representative, or by dialing +1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask for for an Applications Engineer. Please have the following information available when calling:

- Complete model number
- Quick Start Guide or User's Manual
- All MicroDIN configuration information
- Computer Hardware / Software Configuration

Warranty

The MicroDIN is manufactured by ISO 9001-registered processes and is backed by a three-year warranty.

Return Material Authorization (RMA)

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. We need this information:
   - Ship to address
   - Bill to address
   - Contact name
   - Phone number
   - Method of return shipment
   - Your P.O. number
   - Detailed description of the problem
   - Any special instructions
   - Name and phone number of person returning the product.
2. Prior approval and an RMA number, from the Customer Service Department, is needed when returning any unused product for credit. Make sure the RMA number is on the outside of the carton, and on all paperwork returned. Ship on a Freight Prepaid basis.
3. After we receive your return, we will examine the unit and try to verify the reason for the return.
4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned.
5. To return products that are not defective, goods must be be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.
6. If the unit is unrepairable, it will be returned to you with a letter of explanation. Repair costs will not exceed 50 percent of the original cost.
7. Watlow reserves the right to charge for no trouble found (NTF) returns.

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